

Amendments to the Claims

Please amend claims 1-3, 12-13, 15-16, 18, 21-26, 32-34, 39-40, 45-48, 51-53, 56-60, 62-63, 67 and 73, and enter new claims 76-85. A complete listing of the claims with proper claim identifiers follows.

Listing of Claims

1. (Currently amended) A method for injection molding a layer of phase change material around a surface of [[each of]] a [[plurality of identical]] hard disc drive [[components]] component comprising:

- b) providing a [[plurality of identical]] hard disc drive [[components]] component;
- b) placing [[one of]] said [[plurality of identical]] hard disc drive [[components]] component in a mold cavity of an injection molding machine having a controllable fill rate and a controllable injection pressure;
- c) closing said mold cavity;
- d) injecting a molten phase change material into said mold cavity [[at fill rates and injection pressures]];
- e) monitoring [[pressure]] pressures at a plurality of points in the mold cavity during the injection of the molten phase change material; and
- g) using the monitored pressures and a controller to control [[controlling]] the fill [[rate]] of said molten phase change material during injection in a manner that attempts to duplicate a predetermined time-pressure curve for each of said plurality of points in the mold, to thereby obtain said hard disc drive component with the phase change material thereon[; and
- h) repeating steps b)-f) to produce said plurality of components each having a substantially uniform resonance spectrum]].

2. (Currently amended) The method of claim 1 wherein the pressure is monitored at [[a runner to the mold cavity,]] a beginning-of-fill point and an end-of-fill point.

3. (Currently amended) The method of claim 1 further comprising the step of controlling the injection pressure of said molten phase change material to help obtain

said hard disc drive [[components]] component with the phase change material thereon[, having a substantially uniform resonance spectrum]].

4. (Original) The method of claim 1 wherein the injection is carried out until predetermined beginning-of-fill and end-of-fill pressures are reached.

5. (Original) The method of claim 1 wherein the fill rate and injection pressure are controlled to produce a predetermined pressure gradient across the mold cavity.

6. (Original) The method of claim 5 wherein after said predetermined pressure gradient is obtained, said molten material is held in said mold cavity until said material cools and solidifies.

7. (Original) The method of claim 2 wherein the pressure at the end-of-fill point inside the mold cavity is measured by a pressure transducer associated with said end-of-fill point.

8. (Original) The method of claim 7 wherein the pressure transducer is located within the last ten percent of the cavity to fill with molten material.

9. (Original) The method of claim 2 wherein a pressure transducer is placed inside the mold cavity at the beginning-of-fill point.

10. (Original) The method of claim 9 wherein the pressure transducer is located within the first ten percent of the cavity to fill with molten material.

11. (Original) The method of claim 1 wherein a stroke sensor measures the fill rate of molten material.

12. (Currently amended) The method of claim 7 wherein [[a]] the controller controls the injection pressure based on signals transmitted by said pressure transducers to the controller.

13. (Currently amended) The method of claim 11 wherein [[a]] the controller controls the fill rate based upon signals transmitted by said stroke sensor.

14. (Original) The method of claim 13 wherein the controller starts and stops the flow of molten material into said cavity by opening and closing a valve gate associated with said cavity.

15. (Currently amended) The method of claim 1 wherein said [one of said plurality of identical]] hard disc drive [[components are]] component comprises a

component for a motor selected from the group consisting of spindle motors, voice coil motors, and wire wound motors.

16. (Currently amended) The method of claim 1 wherein said ~~[[identical]]~~ hard disc drive ~~[[components are]]~~ component is an electromagnetic ~~[devices]]~~ device.

17. (Original) The method of claim 1 wherein said injection of said molten phase change material has a maximum flow rate above about 25 cm³/sec.

18. (Currently amended) The method of claim 1 wherein ~~[[said]]~~ a plurality of identical ~~[[said]]~~ hard disc drive components ~~[[comprise]]~~ comprising at least one hundred components are molded with phase change material thereon, said at least one hundred components having a median first order frequency and wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about three hundred Hertz of said median first order frequency.

19. (Original) The method of claim 18 wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about one hundred Hertz of said median first order frequency.

20. (Original) The method of claim 18 wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about thirty Hertz of said median first order frequency.

21. (Currently amended) The method of claim 1 wherein a plurality of identical hard disc drive components are molded with phase change material and the resonance spectra of said plurality of hard disc drive components with phase change material thereon have a standard deviation of first order resonance frequency that is at least about twenty five percent less than the standard deviation of the first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

22. (Currently amended) The method of claim 1 wherein a plurality of identical hard disc drive components are molded with phase change material and the resonance spectra of said plurality of hard disc drive components with phase change material

thereon have a standard deviation of first order resonance frequency that is at least about fifty percent less than the standard deviation of the first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

23. (Currently amended) The method of claim 1 wherein said [[one of said plurality of]] hard disc drive [[components]] component is placed in a mold with one or more additional components used in a single hard disc drive and a layer of phase change material is injection molded thereon.

24. (Currently amended) The method of claim 23 wherein said hard disc drive component and said one or more additional hard disc drive components are substantially encapsulated with said phase change material.

25. (Currently amended) The method of claim 24 wherein said [[one of said plurality]] hard disc drive component and said one or more additional hard disc drive components are unitized by a monolithic body of said phase change material.

26. (Currently amended) The method of claim 1 wherein the phase change material is selected from the group consisting of [[comprises a]] thermoplastic material [[or a]] and thermosetting material.

27. (Original) The method of claim 1 wherein the phase change material includes ceramic particles.

28. (Original) The method of claim 1 wherein the phase change material has a coefficient of linear thermal expansion of less than 2×10^{-5} in/in/°F throughout the range of 0°F to 250°F.

29. (Original) The method of claim 1 wherein the phase change material has a coefficient of linear thermal expansion in the X, Y and Z directions, wherein the coefficient of linear thermal expansion is lowest in the X direction, and wherein the coefficient of linear thermal expansion in the Y and Z directions is no more than four times the coefficient of linear thermal expansion in the X direction.

30. (Original) The method of claim 1 wherein the injection molding machine comprises a multi-cavity mold machine.

31. (Original) The method of claim 25 wherein the density of the monolithic

body is substantially uniform.

32. (Currently amended) A plurality of hard disc drive [[component]] components made by the method of claim 1, each having a substantially uniform resonance spectrum.

33. (Currently amended) [[An]] A plurality of electronic [[device]] devices each comprising at least one of the plurality of the hard disc drive [[component]] components of claim 32.

34. (Currently amended) A method of manufacturing hard disc drives having a reproducible resonance spectrum comprising:

a) providing a plurality of identical hard disc drive component sets, wherein each of said sets consists of components that are used in a single hard disc drive;

b) placing and positioning one of said plurality of hard disc drive component sets in a mold cavity of an injection molding machine;

c) closing said mold cavity;

d) monitoring the pressure inside the mold cavity [[at an end-of-fill point]];

e) injecting a molten phase change material into said mold cavity to a pre-determined [[set point]] cavity pressure gradient; and

f) repeating steps b)-e) to produce a plurality of hard disc drives each having a substantially uniform resonance spectrum.

35. (Original) The method of claim 34 wherein after said injecting of molten phase change material, said molten phase change material is held in said mold cavity until said material cools and solidifies into a monolithic body.

36. (Original) The method of claim 34 wherein a controller starts and stops flow of the molten phase change material into said cavity by opening and closing a valve gate associated with said cavity.

37. (Original) The method of claim 34 wherein the pressure at the end-of-fill point inside the mold cavity is measured by a pressure transducer associated with said end-of-fill point.

38. (Original) The method of claim 34 wherein a pressure transducer is also

located inside the mold cavity at a beginning-of-fill point.

39. (Currently amended) The method of claim 34 wherein said set of hard disc drive components comprises a stator [[, voice coil motor]] and a base plate.

40. (Currently amended) The method of claim 34 wherein said plurality of said hard disc drive component sets comprise at least one hundred component sets with phase change material thereon, said at least one hundred component sets having a median first order frequency and wherein each of said at least one hundred hard disc drive component sets with a phase change material thereon has a first order frequency that is within about three hundred Hertz of said median first order frequency.

41. (Original) The method of claim 40 wherein each of said at least one hundred hard disc drive component sets with a phase change material thereon has a first order frequency that is within about one hundred Hertz of said median first order frequency.

42. (Original) The method of claim 40 wherein each of said at least one hundred hard disc drive component sets with a phase change material thereon has a first order frequency that is within about thirty Hertz of said median first order frequency.

43. (Original) The method of claim 34 wherein the resonance spectra of said plurality of hard disc drive component sets with phase change material thereon have a standard deviation of first order resonance frequency that is at least about twenty five percent less than the standard deviation of first order resonance frequency for the same number of the same component sets over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

44. (Original) The method of claim 34 wherein the resonance spectra of said plurality of hard disc drive component sets with phase change material thereon have a standard deviation of first order resonance frequency that is at least about fifty percent less than the standard deviation of first order resonance frequency for the same number of the same component sets over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

45. (Currently amended) The method of claim [[34]] 35 wherein said set of

hard disc drive components are unitized by said monolithic body.

46. (Currently amended) A method for injection molding a layer of phase change material around a surface of [[each of]] a [[plurality of identical]] motor [[components]] component comprising:

- a) providing a [[plurality of identical]] motor [[components]] component;
- b) placing [[one of]] said [[plurality of identical]] motor [[components]] component in a mold cavity of an injection molding machine having a controllable fill rate and a controllable injection pressure;
- c) closing said mold cavity;
- d) injecting a molten phase change material into said mold cavity [[at a fill rate and injection pressure]];
- e) monitoring [[pressure]] pressures at a plurality of points in the mold cavity during the injection of the molten phase change material; and
- f) using the monitored pressures and a controller to control [[controlling either]] the fill [[rate or injection pressure or both]] of said molten phase change material during injection in a manner that attempts to duplicate a predetermined time-pressure curve for each of said plurality of points in the mold, to thereby obtain said motor component with the phase change material thereon[[; and
- g) repeating steps b)-f) to produce said plurality of motor components each having a substantially uniform resonance spectrum]].

47. (Currently amended) The method of claim 46 wherein the pressure is monitored at [[an injection to the mold cavity,]] a beginning-of-fill point and an end-of-fill point.

48. (Currently amended) The method of claim 47 [[further comprising]] wherein the step of controlling the fill comprises controlling the injection pressure of said molten phase change material to help obtain said motor [[components]] component with the phase change material thereon.

49. (Original) The method of claim 46 wherein the injection is carried out until predetermined beginning-of-fill and end-of-fill pressures are reached.

50. (Original) The method of claim 47 wherein the pressure at the end-of-fill point inside the mold cavity is measured by a pressure transducer associated with said end-of-fill point.

51. (Currently amended) The method of claim 46 wherein a plurality of motor ~~[[component sets]]~~ components are provided to produce a motor with a phase change material on a portion of the surface of said motor, wherein ~~[[each motor component set comprises]]~~ said motor components ~~[[that]]~~ are used in a single motor.

52. (Currently amended) The method of claim 51 wherein said motor is a motor selected from the group consisting of motors for use in automobiles, ~~[[or]]~~ motors for use in appliances and ~~[[or]]~~ motors for use in power tools.

53. (Currently amended) The method of claim 46 wherein ~~[[said]]~~ a plurality of ~~[[said]]~~ identical motor components ~~[[comprise]]~~ comprising at least one hundred components are molded with phase change material thereon, said at least one hundred components having a median first order frequency and wherein each of said at least one hundred motor components with a phase change material thereon has a first order frequency that is within about three hundred Hertz of said median first order frequency.

54. (Original) The method of claim 53 wherein each of said at least one hundred motor components with a phase change material thereon has a first order frequency that is within about one hundred Hertz of said median first order frequency.

55. (Original) The method of claim 53 wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about thirty Hertz of said median first order frequency.

56. (Currently amended) The method of claim 46 wherein a plurality of identical motor components are molded with phase change material and the resonance spectra of said plurality of motor components with phase change material thereon have a standard deviation of first order resonance frequency that is at least about twenty five percent less than the standard deviation of first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

57. (Currently amended) The method of claim 46 wherein a plurality of identical motor component sets are molded with phase change material and the resonance spectra of said plurality of motor component sets with phase change material thereon have a standard deviation of first order resonance frequency that is at least about fifty percent less than the standard deviation of first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

58. (Currently amended) The method of claim ~~[[1]]~~ 46 wherein the phase change material has a coefficient of linear thermal expansion of less than 2×10^{-5} in/in/°F throughout the range of 0°F to 250°F.

59. (Currently amended) The method of claim ~~[[1]]~~ 46 wherein the phase change material has a coefficient of linear thermal expansion in the X, Y and Z directions, wherein the coefficient of linear thermal expansion is lowest in the X direction, and wherein the coefficient of linear thermal expansion in the Y and Z directions is no more than four times the coefficient of linear thermal expansion in the X direction.

60. (Currently amended) A method of reducing sympathetic resonances of a component ~~[[system wide resonances of components]]~~ in a hard disc drive comprising:

- a) providing a hard disc drive component;
- b) determining a desired resonance spectrum of frequencies to avoid ~~for~~ said hard disc drive component;
- c) placing said hard disc drive component in a mold cavity of an injection molding machine having a controllable fill rate and a controllable injection pressure;
- d) closing said mold cavity;
- e) injecting a molten phase change material into said mold cavity ~~[[at a fill rate and an injection pressure]]~~;
- f) monitoring and controlling the pressure in the mold cavity; and

g) monitoring and controlling one or more of the fill rate of said molten phase change material and injection pressure to obtain said hard disc drive component with the phase change material thereon, having said desired resonance spectrum.

61. (Original) The method of claim 60 wherein said desired resonance spectrum is achieved by tuning the fill rate and pressure to a predetermined set-point fill rate and a predetermined set-point pressure.

62. (Currently amended) A method for injection molding a layer of phase change material around a surface of a plurality of identical hard disc drive components comprising:

- a) providing a plurality of hard disc drive components;
- b) placing one of said plurality of hard disc drive components in a mold cavity of an injection molding machine having a controllable fill rate and a controllable injection pressure;
- c) closing said mold cavity;
- d) injecting a molten phase change material into said mold cavity [[at desired fill rates and injection pressures]];
- e) monitoring and controlling pressure in the mold cavity;
- f) monitoring and controlling one or more of the fill rate and the injection pressure of said molten phase change material to obtain said hard disc drive component with the phase change material thereon having a reproducible resonance spectrum; and
- g) repeating steps b)-f) to produce said plurality of components each having a substantially uniform resonance spectrum.

63. (Currently amended) The method of claim 62 wherein the pressure is monitored at [[a runner to the mold cavity,]] a beginning-of-fill point and an end-of-fill point.

64. (Original) The method of claim 62 further comprising the step of controlling the fill rate of said molten phase change material to obtain said hard disc drive components with the phase change material thereon.

65. (Original) The method of claim 62 wherein the injection is carried out until predetermined beginning-of-fill and end-of-fill pressures are reached.

66. (Original) The method of claim 62 wherein the pressure at the end-of-fill point inside the mold cavity is measured by a pressure transducer associated with said end-of-fill point.

67. (Currently amended) The method of claim 62 wherein said plurality of said hard disc drive components comprise at least one hundred components with phase change material thereon, said at least one hundred components having a median first order frequency and wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about three hundred Hertz of said median first order frequency.

68. (Original) The method of claim 67 wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about one hundred Hertz of said median first order frequency.

69. (Original) The method of claim 67 wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about thirty Hertz of said median first order frequency.

70. (Original) The method of claim 62 wherein the resonance spectra of said plurality of hard disc drive components with phase change material thereon have a standard deviation of first order resonance frequency that is at least about twenty five percent less than the standard deviation of first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

71. (Original) The method of claim 62 wherein the resonance spectra of said plurality of hard disc drive components with phase change material thereon have a standard deviation of first order resonance frequency that is at least about fifty percent less than the standard deviation of first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only the injection pressure and either the injection time or stroke of an extrusion screw are controlled.

72. (Original) The method of claim 62 wherein the phase change material has a coefficient of linear thermal expansion of less than 2×10^{-5} in/in/°F throughout the range of 0°F to 250°F.

73. (Currently amended) The method of claim ~~[[1]]~~ 62 wherein the phase change material has a coefficient of linear thermal expansion in the X, Y and Z directions, wherein the coefficient of linear thermal expansion is lowest in the X direction, and wherein the coefficient of linear thermal expansion in the Y and Z directions is no more than four times the coefficient of linear thermal expansion in the X direction.

74. (Original) A method of injection molding hard disc drive components having a reproducible resonance spectrum comprising:

- a) providing at least one hundred identical hard disc drive components; and
- b) over-molding a monolithic body of phase change material on a surface of said hard disc drive components using an injection molding process, wherein said components with a phase change material thereon have a median first order frequency and wherein each of said at least one hundred hard disc drive components with a phase change material thereon has a first order frequency that is within about one hundred Hertz of said median first order frequency.

75. (Original) A method of injection molding hard disc drive components having a reproducible resonance spectrum comprising:

- a) providing at least one hundred identical hard disc drive components, wherein each of said components has a resonance spectrum; and
- b) over-molding a monolithic body of phase change material on a surface of said hard disc drive components using an injection molding process, wherein the resonance spectra of said at least one hundred hard disc drive components with phase change material thereon have a standard deviation of first order resonance frequency that is at least about fifty percent less than the standard deviation of first order resonance frequency for the same number of the same components over-molded with an injection molding process wherein only injection pressure and either injection time or stroke of an extrusion screw are controlled.

76. (New) A method of manufacturing motors having a reproducible resonance spectrum comprising:
- a) providing a plurality of identical motor component sets, wherein each of said sets consists of components that are used in a single motor;
 - b) placing and positioning one of said plurality of motor component sets in a mold cavity of an injection molding machine;
 - c) closing said mold cavity;
 - d) monitoring the pressure inside the mold cavity;
 - e) injecting a molten phase change material into said mold cavity to a pre-determined cavity pressure gradient; and
 - f) repeating steps b)-e) to produce a plurality of motors each having a substantially uniform resonance spectrum.
77. (New) The method of claim 1 wherein the step of controlling the fill comprises controlling the fill rate of the molten phase change material.
78. (New) The method of claim 1 wherein the step of controlling the fill comprises controlling the fill pressure of the molten phase change material.
79. (New) The method of claim 1 wherein the step of controlling the fill comprises closing a valve gate when a predetermined mold cavity pressure is reached.
80. (New) The method of claim 1 wherein the step of controlling the fill comprises controlling the fill amount.
81. (New) The method of claim 34 wherein the monitored pressure includes the pressure at an end-of-fill point in the cavity.
82. (New) A method for injection molding a layer of phase change material around a surface of a component for an electrical device comprising:
- a) placing said component in a mold cavity of an injection molding machine;
 - b) closing said mold cavity;
 - c) injecting a molten thermoplastic polymer which exhibits non-Newtonian rheology into said mold cavity;
 - d) monitoring the effective viscosity of the polymer and controlling the injection rate of the polymer to control the apparent viscosity of the polymer and

thus compensate for changes of viscosity due to intrinsic factors in the polymer to obtain a desired viscosity, and thereby produce said component with the phase change material thereon.

83. (New) The method of claim 82 wherein the effective viscosity of the polymer is monitored by monitoring the injection pressure inside the injection molding machine.

84. (New) The method of claim 82 wherein the effective viscosity of the polymer is monitored by monitoring the hydraulic pressure applied to a driving screw in a hydraulically powered injection molding machine.

85. (New) The method of claim 82 wherein the effective viscosity of the polymer is monitored by monitoring a stroke sensor in the injection molding machine.